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Received November 12, 1772.

XIX. *Experiments upon the different Kinds of Marle found in Staffordshire*
by Charles Morton, M. D. Sec.

Read Feb. 4, 1773.

Number.	Description.	Quantity of cal- carious earth in half a dram, as separated by the nitrous acid, and precipitated by mild fixed al- kaly.	What was left after the fo no longer acted upon b being
		Grains.	Mixed with water, became
1.	Red and blue intermixed, in small friable lumps.	1	Uniform and plastic. A
2.	Red, in small friable lumps.	$0\frac{3}{4}$	Uniform and plastic. A
3.	Grey, in large hard lumps.	5	Plastic, but a little gritty. A
4.	Red, hard, compact.	3	Uniform and plastic. A
5.	Red, with grey spots, in large hard lumps, scarcely to be broken with a hammer.	$8\frac{1}{2}$	Plastic. A
6.	Light grey, like a grit stone.	8	Gritty, no union. N
7.	Brown, friable, in large lumps.	18	No union. N
8.	Red, in large friable lumps.	14	Plastic, but a little gritty. A
9.	Brownish white, very hard, like calcarious incrustations.	16	No union, gritty. N
10.	Lead colour, friable, flaky.	$14\frac{1}{2}$	No union, gritty. N
11.	Brown grey, very hard, in irregular lumps.	16	No union, gritty. N
12.	Lead colour, in powder and in small hard lumps.	$20\frac{1}{2}$	Uniform and plastic. A

Half a dram of the marles being put into similar glass cups, two drams of nitrous acid being added to each glass, they all ceased, and six drams of rain water being added to each glass, the liquors were all filtered, and after filtration, changed violet alkali, sufficient to saturate the acid, and precipitate all the earth it had dissolved. The precipitated earth being washed in third. Column the fourth shews that, after the separation of the calcarious earth, there remained in N° 1, 2, 4, a red clay whitish clay, with a portion of sand; in N° 6, 9, 10, 11. pure sand; and in N° 7. sand, with a small portion of clay. The precipitated powders being mixed together, 82 grains thereof put into a crucible, and calcined with a strong hear, lost 35 grains in pellicle upon the surface of the water; it tasted strongly of lime, and let fall a calcarious earth, upon the addition of mild fixed made use of. They were all got out of marle pits in the neighbourhood of Stafford, except N° 12, which is found near the D part of clay is burnt to quick lime. All the above marles crack and fall to pieces, when exposed to the weather.

The foregoing experiments were undertaken with a view to ascertain how far it would be advisable to attempt burning the likewise furnish us with some useful hints relative to the kind of marles proper to be used upon different kinds of lands. The best for light sandy soil; and N° 6, 9, 10, 11, where the calcarious earth is united with sand, the most eligible where the la fixable air, or other volatile parts, contained in each of the marles, as shewn by column the fifth, will influence their preference.

Received November 12, 1772.

Marle found in Staffordshire, by William Withering, M. D. Communicated
Charles Morton, M. D. Sec. R. S.

Read Feb. 4, 1773.

Quantity of cal- carious earth in half a dram, as separated by the nitrous acid, and precipitated by mild fixed al- kaly.			What was left after the foregoing separation, was no longer acted upon by the nitrous acid ; but being			One dram of each of the marles being calcined, weighed			The calcined marles put into water, produced		
Grains.			Mixed with water, became		When burnt	Grains.	Loft grains.	Burnt to			
1			Uniform and plastic.		A hard red brick.	52	8	Red brick.		No effect.	
0 $\frac{3}{4}$			Uniform and plastic.		A hard red brick.	53	7	Red brick.		No effect.	
5			Plastic, but a little gritty.		A soft yellowish brick.	49	11	Soft yellow brick.		Weak lime water.	
3			Uniform and plastic.		A hard red brick.	50	10	Red brick.		No effect.	
8 $\frac{1}{2}$			Plastic.		A soft pale red brick.	48	12	Hard grey stone.		Lime water.	
8			Gritty, no union.		No union.	51	9	Soft and stony.		Lime water.	
18			No union.		A little cohesion.	46	14	Soft stone.		Lime water.	
14			Plastic, but a little gritty.		A soft red brick.	48	12	Soft stone.		Strong lime water.	
16			No union, gritty.		No union.	43	17	Soft stone.		Strong lime water.	
14 $\frac{1}{2}$			No union, gritty.		No union.	48	12	Soft stone.		Strong lime water.	
16			No union, gritty.		No union.	40	20	Soft stone.		Strong lime water.	
20 $\frac{1}{2}$			Uniform and plastic.		A soft whitish brick.	29	31	Powdery.		Strong lime water.	

ous acid being added to each glass, they all effervesced ; N° 1 and 2 the least, N° 12 the most. The effervescence having
l filtered, and after filtration, changed violet paper to a red colour. To the filtered colours was gradually added mild fixed
. The precipitated earth being washed in rain water, till free from all saline matter, weighed, when dry, as in column the
, there remained in N° 1, 2, 4, a red clay ; in N° 12 a white clay ; in N° 8 a red clay, and a portion of sand ; in N° 3 a
N° 7. sand, with a small portion of clay. These residuums were all washed with rain water before they were burnt. The pre-
d calcined with a strong hear, loft 35 grains in weight. Rain water was poured upon the calx ; the next morning there was a
carious earth, upon the addition of mild fixed alkaly. The marles were kept for some weeks in a dry place before they were
d, except N° 12, which is found near the Duke of Bridgewater's canal, in a powdery form, and when mixed with one fourth
, when exposed to the weather.

it would be advisable to attempt burning the marles of this country into quicklime, for the purposes of agriculture ; they may
be used upon different kinds of lands. Perhaps the calcarious earth united with clay, as in N° 1, 2, 4, &c. may be the
ed with sand, the most eligible where the land is already stiff, and abounding with clay. How far the different quantities of
column the fifth, will influence their preference in agriculture, must be left to the experience of the farmer to determine.